Animal Studies

Authors	Date	Type of Study	Animal	Toxicity Value	Effects
Benninghoff, A.D. et al.	2011	Subchronic dietary exposure	Rainbow trout	5ppm	Potent inducer of the estrogen-responsive biomarker protein vitellogenin (Vtg) in vivo, although at fairly high dietary exposures. A structure-activity relationship for PFAAs was observed, where eight to ten fluorinated carbons and a carboxylic acid end group were optimal for maximal Vtg induction.

Human Studies

Authors	Date	Type of Study	Methods	Findings
Corsini, E., et al.	2014	Summary of existing studies		There is evidence from both epidemiology and laboratory studies that PFCs may be immunotoxic. Immunotoxicity can occur at serum concentrations below, within, or just above the reported range for highly exposed human and wildlife. Considering bioaccumulation and exposure to multiple PFCs, the risk of immunotoxicity to humans and wildlife cannot be discounted.

Falandysz, J., et al.	2006	Cross Sectional	Bloood draw and survey of Baltic Sea fish consumption	Individuals who declared to have a high fish intake in their diet (mainly Baltic fish) on average contained the highest load of all 10 fluorochemicals when compared with the other human subpopulations. Baltic seafood has been found to highly influence human body burden of PFOS, PFNA, and (PFHxS, PFOSA, PFHxA, PFHpA, PFDA, PFUnDA, and PFDoDA) and to a lesser extent PFOA.
Granum, B., et al.	2013	Birth Cohort	Blood draw at time of delivery and from children at 3 years. Survey	Inverse relationship between the level of anti-rubella antibodies in the children's serum at age 3 years and the concentration of four PFCs (PFOA, PFNA, PFOS, and PFHxS). Positive association between the maternal concentrations of PFOA and PFNA and the number of episodes of the common cold for the children,
Kato, K., et al.	2011	Cohort (NHANES survey)	Blood draw and survey	PFNA concentrations showed a significant upward trend. (1999-2008)

Title	Additional Info	Link
Estrogen Like Activity of Perfluoroalkyl Acids in Vivo and Interaction with Human and Rainbow Trout Estrogen Receptors in Vitro.		http://toxsci.oxfordjournals.org/content/120/1/42.full

Title	Link
Perfluorinated Compounds: Emerging POPs with Potential Immunotoxicity	http://www.sciencedirect.com/science/article/pii/S0378427414000587#

Is Fish a Major Source of Fluorinated Surfactants and Repellents in Humans Living on the Baltic Coast?	http://pubs.acs.org/doi/pdf/10.1021/es051799n
Pre-natal Exposure to Perfluoroalkyl Substances May be Associated with Altered Vaccine Antibody Levels and Immune-related Health Outcomes in Early	http://informahealthcare.com/doi/pdf/10.3109/1547691X.2012.755580
Trends in Exposure to Polyfluoroalkyl Chemicals in the U.S. Population: 1999-2008	http://pubs.acs.org/doi/pdf/10.1021/es1043613

Animal Studies

Authors	Date	Type of Study	Animal	Toxicity Value
Abbott, B.D. et al.	2007	Developmental	Mice	0.6mg/kg 1mg/kg
Benninghoff, A.D. et al.	2011	Subchronic dietary exposure	Rainbow trout	5ppm
D'Hollander, W., et al.	2010	Observational		

Human Studies

Authors	Date	Type of Study	Methods	Findings

Apelberg, B.J., et al.	2007	Cross Sectional	Cord serum and birth characteristics	After adjusting for potential confounders, both PFOS and PFOA were negatively associated with birth weight (per ln unit: Beta = -104g, 95% CI -213 to 5), ponderal index (per ln unit: Beta = -0.070 g/cm^3 *
Barry, V., Winquist, A., and Steenland, K.	2013	Cohort	2 Blood draws and a survey	Estimated cumulative serum PFOA concentrations were positively associated with **kidney and testicular cancer** [hazard ratio (HR) = 1.10; 95% CI: 0.98, 1.24 and HR = 1.34; 95% CI: 1.00, 1.79, respectively, for 1-unit increases in ln-transformed serum PFOA]. Categorical analyses also indicated positive trends with
Beeson, S., et al.	2011	Pregnancy cohort	House dust samples, maternal serum, and umbilical cord serum	PFOA isomer signatures revealed that telomer sources accounted for 0-95% of total PFOA in house dust (median 31%). This partly explains why serum PFOA concentrations are not declining in some countries during the phase out of electrochemical PFOA. TTE data suggests that total branched isomers crossed the placenta
Corsini, E., et al.	2014	Summary of existing studies		There is evidence from both epidemiology and laboratory studies that PFCs may be immunotoxic. Immunotoxicity can occur at serum concentrations below, within, or just above the reported range for

Costa, G., Sartori, S., and Consonni, D.	2009	Cohort	Yearly blood sample and analysis, occupational info.	Significant association of total cholesterol and uric acid with PFOA serum level was evidenced.
Dong, G.H. et al.	2013	Case Control	Survey, urine sample, serum sample	OR of 4.05 (95% CI: 2.21, 7.42) of having asthma for those in the highest vs the lowest quartile of PFOA exposure. (Child in the 4th quartile of PFOA exposure has 4.05 times the odds of having asthma
Emmet, E.A, et al.	2006	Cohort	Blood sample, survey, living location correspond with water source)	Positive assocaition between PFOA concentrations and serum ALT, a marker of hepatocellular damage. [PFOA: coefficient,
Falandysz, J., et al.	2006	Cross Sectional	Bloood draw and survey of Baltic Sea fish consumption	Individuals who declared to have a high fish intake in their diet (mainly Baltic fish) on average contained the highest load of all 10 fluorochemicals when compared with the other

Fei, C., et al. 2007	1,400 women sub cohort from the Dansih national Birth Cohort	Maternal blood sample, cord blood sample, birth characteristics	PFOS and PFOA levels in maternal plasma were on average 35.3 and 5.6 ng/mL, respectively. Only PFOA levels were inversely associated with birth weight (adjusted β = −10.63 g; 95% confidence
Fei, C., et al. 2008	1,400 women sub cohort from the Dansih national Birth Cohort	Maternal blood sample, cord blood sample, birth characteristics	Maternal PFOA levels in early pregnancy were associated with smaller abdominal circumference and birth length. For each ng/ml increase in PFOA, birth length decreased by 0.069 cm (95% confidence interval: 0.024, 0.113) and abdominal circumference decreased by 0.059 cm (95% confidence
Fromme, H., 2010 et al.	Pregnancy cohort	Pregnancy blood draw, umbilical cord blood, child's blood at 19 months, and breast milk samples	found low levels of PFCs in cord sera and an increase in concentrations through the first months of infant life. Although the concentrations in breast milk were low, this intake led to a body burden at the age of six

Geiger, S.D., et al.	2014	Cross Sectional (NHANES Survey)	Blood draw and survey (all under <=18 years	Serum PFOA and PFOS were positively associated with high total cholesterol and LDL-C, independent of age, sex, race-ethnicity, BMI, annual household income, physcial activity and serum cotinine levels. Compared to subjects in quartile 1 (referent) the multivariable adjusted OR for high total cholesterol among children in
Granum, B., et al.	2013	Birth Cohort	Blood draw at time of delivery and from children at 3 years. Survey	Inverse relationship between the level of anti-rubella antibodies in the children's serum at age 3 years and the concentration of four PFCs (PFOA, PFNA, PFOS, and PFHxS). Positive association between the maternal concentrations of PFOA and PFNA and the number of
Kato, K., et al.	2011	Cohort (NHANES survey)	Blood draw and survey	PFOA concnetration during 1999-2000 were significantly higher than during any other time period examined.
Nolan, L.A., et al.	2008	Cross Sectional	Zip code (determined where there water supply was coming from), and birth weight, weeks of gestation.	The incidence of low birth weight, preterm birth, mean birth weight, and mean gestational age of neonates did not significantly differ among water service categories.

Okada, E., et al.	2012	Cohort	Cord blood and survey at 18 months.	Cord blood IgE levels decreased significantly with high maternal PFOA concentration among female infants. However, there were no significant associations

Effects	Title	Additional Info
neonatal survival reduced eye opening was delayed	Perfluorooctanoic Acid Induced Developmental Toxicity in the Mouse is Dependent on Expression of Peroxisome Proliferator Activated Receptor-Alpha	
Potent inducer of the estrogen-responsive biomarker protein vitellogenin (Vtg) in vivo, although at fairly high dietary exposures. A structure-activity relationship for PFAAs was observed, where eight to ten fluorinated carbons and a carboxylic acid end group were optimal for maximal Vtg induction.	Estrogen Like Activity of Perfluoroalkyl Acids in Vivo and Interaction with Human and Rainbow Trout Estrogen Receptors in Vitro.	
	Perfluoronated compounds in Human Food and Other Sources of Human Exposure	It has been shown that PFOA is detected at much lower concentrations than is PFOS. As a consequence, in most studies the concentrations of PFOA recorded in fish tissue remained below the detection limit. However, quantifiable concentrations were detected in lake trout, rainbow smelt, and alewife, with concentrations ranging from 0.16 to 6.8 ng/g wwt. Therefore, it is interesting to note that PFC levels in liver are at least two orders of magnitude higher than exists in muscle tissue In a few studies, positive correlations were found between PFC body burdens and self-reported fish consumption. In Poland, blood samples from 45 donors living near the Baltic Sea were analyzed in 2004 (Falandysz et al. 2006). Groups of people with a high consumption of regionally captured fish showed statistically higher PFC blood levels than the groups who consumed less regionally captured fish. The authors concluded that the consumption of seafood was an important determinant for internal PFC exposure.

	Title	Additional Info

justing for potential confounders, both d PFOA were negatively associated h weight (per ln unit: Beta = -104g, 213 to 5), ponderal index (per ln unit: 0.070 g/cm^3 * 100, 95% CI -0.138 to - and head circumferece (per ln unit: 0.41cm, 95% CI -0.76 to -0.07) for No on between PFOS or PFOA on nal age or newborn length.	Cord Serum Concentrations of Perfluorooctane Sulfate (PFOS)and Perfluorooctanoat e (PFOA) in Relation to Weight and Size at Birth.	Ponderal index = ratio of birth weight (grams) to length (cm cubed), multiplied by 100. Small Negative associations.
cumulative serum PFOA concentrations were associated with **kidney and testicular** zard ratio (HR) = 1.10; 95% CI: 0.98, 1.24 and 95% CI: 1.00, 1.79, ly, for 1-unit increases in ln-transformed serum tegorical analyses also indicated positive trends asing exposures for both cancers: for kidney s for increasing exposure quartiles were 1.0, and 1.58 (linear trend test p = 0.18) and for cancer, HRs were 1.0, 1.04, 1.91, 3.17 (linear p = 0.04).	Perfluorooctanoic Acid (PFOA) Exposures and Incident Cancers among Adults Living Near a Chemical Plant.	
ner signatures revealed that telomer sources for 0-95% of total PFOA in house dust (median s partly explains why serum PFOA tions are not declining in some countries during out of electrochemical PFOA. uggests that total branched isomers crossed ta more efficiently than did linear isomers for 0.02) The profile of PFOS and PFOA isomers can differ he mother and fetus-- an important tion for perinatal epidemiology studies of PFCs.	Isomer Profiles of Perfluorochemicals in Matched Maternal, Cord, and House Dust Samples: Manufacturing Sources and Transplacental Transfer.	
evidence from both epidemiology and ry studies that PFCs may be toxic. toxicity can occur at serum rations below, within, or just above the d range for highly exposed human and Considering mulation and exposure to multiple e risk of immunotoxicity to humans life cannot be discounted.	Perfluorinated Compounds: Emerging POPs with Potential Immunotoxicity	

nt association of total cholesterol and with PFOA serum level was evidenced.	Thirty Years of Medical Surveillance in Perfluorooctanoic Acid Production Workers	Total cholesterol in mg/dL, p =0.039 Uric Acid in mg/dL, p = 0.003
05 (95% CI: 2.21, 7.42) of having for those in the highest vs the lowest of PFOA exposure. (Child in the 4th of PFOA exposure has 4.05 times the having asthma than a child in the uartile of PFOA exposure.)	Serum Polyfluoroalkyl Concentrations, Asthma Outcomes, and Immunological Markers in a Case-Control Study of Taiwanese Children.	
assocaition between PFOA rations and serum ALT, a marker of ellular damage. oefficient, 0.022; 95% confidence (CI): 0.018, 0.025]	Community Exposure to Perfluorooctanoate: Relationships between Serum Concentrations and Exposure Sources	
als who declared to have a high fish their diet (mainly Baltic fish) on contained the highest load of all 10 emicals when compared with the uman subpopulations. afood has been found to highly e human body burden of PFOS, PFNA, HxS, PFOSA, PFHxA, PFHpA, PFDA, , and PFDoDA) and to a lesser extent	Is Fish a Major Source of Fluorinated Surfactants and Repellents in Humans Living on the Baltic Coast?	

d PFOA levels in maternal plasma were ge 35.3 and 5.6 ng/mL, respectively. OA levels were inversely associated h weight (adjusted β = −10.63 g; 95% ce interval, −20.79 to −0.47 g). maternal PFOS nor PFOA levels were ntly associated with the risk for birth or low birth weight. We d no adverse effects for maternal PFOS levels on small for gestational age.	Perfluorinated Chemicals and Fetal Growth: A Study within the Danish National Birth Cohort	PFOA corrected for: Term of birth (Pre-term, term, or post-term), parity, sex, and prepregnancy BMI.
l PFOA levels in early pregnancy were ed with smaller abdominal erence and birth length. For each ng/ml in PFOA, birth length ed by 0.069 cm (95% confidence 0.024, 0.113) and abdominal erence decreased by 0.059 cm (95% ce interval: 0.012, 0.106). An inverse on was also observed between PFOA ental weight and head circumference, sitive association was observed with n ponderal ut none of these associations was lly significant	Fetal Growth Indicators and Perfluorinated Compounds: A Study in the Danish National Birth Cohort	Adjusted for gestational age, quadratic gestational age, infant sex (male or female), maternal age (<25, 25–29, 30–34, or 35 years), socioeconomic status (high, middle, or low), parity (0, 1, 2, or 3), cigarette smoking (nonsmoker, former smoker, smoker of 1–9 cigarettes/day, or smoker of 10 cigarettes/day), prepregnancy body mass index (weight (kg)/squared height (m2); <18.5, 18.5–24.9, 25.0–29.9, or 30.0), and gestational week atblood drawing. These findings suggest that fetal exposure to PFOA but not PFOS during organ development may affect the growth of organs and the skeleton. The small decreases in some growth measures (birth length and abdominal circumference) and the positive association with ponderal index could suggest that growth restriction is not limited to a reduction of fat tissue.
w levels of PFCs in cord sera and an in concentrations through the first of infant life. Although the rations in breast milk were low, this d to a body burden at the age of six higher than (PFOA) that found in	Pre- and postnatal exposure to perfluorinated compounds (PFCs)	

OA and PFOS were positively associated with cholesterol and LDL-C, independent of age, sex, city, BMI, annual household income, physcial d serum cotinine levels. Compared to subjects 1 (referent) the multivariable adjusted OR for cholesterol among children in quartile 4 was -2.12) for PFOA. PFOA were not significantly associated with HDL-C and triglyceride levels. dicate that serum PFOA and PFOS are ly associated with dyslipidemia ents, even at the lower ''background'' exposure he US general population.	The Association Between PFOA, PFOS and Serum Lipid Levels in Adolescents.	
elationship between the level of anti- ntibodies in the children's serum at age 3 d the concentration of four PFCs (PFOA, OS, and PFHxS). ssociation between the maternal ations of PFOA and PFNA and the number es of the common cold for the children ween PFOA and the incidence of teritis.	Pre-natal Exposure to Perfluoroalkyl Substances May be Associated with Altered Vaccine Antibody Levels and Immune-related Health Outcomes in Early Childhood.	
ncnetration during 1999-2000 were ntly higher than during any other time xamined, but PFOA concentration have d essentially unchanged during 2003-	Trends in Exposure to Polyfluoroalkyl Chemicals in the U.S. Population: 1999-2008	
dence of low birth weight, preterm ean birth weight, and mean gestational eonates did not significantly differ vater service categories.	The Relationship Between Birth Weight, Gestational Age, and Perfluorooctanoic Acid (PFOA)-Contaminated Public Drinking Water	Water service categories = water provided completely by Little Hocking Water Association, water provided partially by LHWA, and not at all provided by LHWA. LHWA had the highest levels of PFOA, residents have mean serum levels 80x the general population.

od IgE levels decreased significantly n maternal PFOA concentration among nfants. However, there were no nt associations among maternal PFOS A levels and food allergy, eczema, g, or otitis media in the 18 month-old adjusted for confounders).	Prenatal Exposure to Perfluorinated Chemicals and Relationship wth Allergies and Infectious Diseases in Infants.	IgE is important in parasitic infections and allergic responses.

Link

http://toxsci.oxfordjournals.org/content/98/2/571.full

http://toxsci.oxfordjournals.org/content/120/1/42.full

http://link.springer.com/chapter/10.1007%2F978-1-4419-6880-7_4/fulltext.html#CR53

Link

http://www.jstor.org/discover/10.2307/4626991?uid=3739832&uid=2&uid=4&uid=3739256&sid=2110433766952

http://ehp.niehs.nih.gov/wp-content/uploads/121/11-12/ehp.1306615.pdf

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3226492/

http://www.sciencedirect.com/science/article/pii/S0378427414000587#

http://journals.lww.com/joem/Abstract/2009/03000/Thirty_Years_of_Medical_Surveillance_in.11.aspx

http://ehp.niehs.nih.gov/1205351/

http://ehp.niehs.nih.gov/1104436/

http://pubs.acs.org/doi/pdf/10.1021/es051799n

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2072850/

http://aje.oxfordjournals.org/content/168/1/66.full.pdf+html

http://pubs.acs.org/doi/full/10.1021/es101184f

http://www.sciencedirect.com/science/article/pii/S0045653513013775

http://informahealthcare.com/doi/pdf/10.3109/1547691X.2012.755580

http://pubs.acs.org/doi/pdf/10.1021/es1043613

http://www.sciencedirect.com/science/article/pii/S0013935111002477

Animal Studies

Authors	Date	Type of Study	Animal	Toxicity Value	Effects
D'Hollander, W., et al.	2010	Observational	Various fish and marine animals		

Human Studies

Authors	Date	Type of Study	Methods	Findings
Alexander, B. H., and Olsen, G.W.	2007	Cohort	Bladder cancer diagnosis, and ranking occupational exposure as none, high, or low.	The standardized incidence ratio of having bladder cancer was 1.28 (95% CI 0.64-2.29) for the entire cohort and 1.47 (95% CI 0.64-3.79) for those ever working in a high exposed job. Compared with employees in the lowest cumulative exposure category, the relative risk of bladder cancer was 0.83 (95% CI 0.15-4.65) for those with 1 to <= 5 years in high exposure job, 1.92 (95% CI 0.30-12.06) 5 to <= 10 years in a high exposure job, and 1.52 (95% CI 0.21- 10.99), greater than 10 years in high exposure job.
Apelberg, B.J., et al.	2007	Cross Sectional	Cord serum and birth characteristics	After adjusting for potential confounders, both PFOS and PFOA were negatively associated with birth weight (per ln unit: Beta = -69g, 95% CI -145 to10), ponderal index (per ln unit: Beta = -0.074 g/cm^3 * 100, 95% CI -0.123 to -0.025), and head circumferece (per ln unit: Beta = -0.32cm, 95% CI -0.56 to -0.07) for PFOS. No association between PFOS or PFOA on gestational age or newborn length.

Beeson, S., et al.	2011	Pregnancy cohort	House dust samples, maternal serum, and umbilical cord serum	TTE data suggests that total branched isomers crossed the placenta more efficiently than did linear isomers for PFOS ($p < 0.01$) The exposure profile of PFOS and PFOA isomers can differ between the mother and fetus-- an important consideration for perinatal epidemiology studies of PFCs. Placental transfer of branched isomers of PFOS increased as the branching point moved closer to the sulfonate (SO3–) end of the molecule.
Corsini, E., et al.	2014	Summary of existing studies		There is evidence from both epidemiology and laboratory studies that PFCs may be immunotoxic. Immunotoxicity can occur at serum concentrations below, within, or just above the reported range for highly
Emmet, E.A, et al.	2006	Cohort	Blood sample, survey, living location correspond with water source)	Positive assocaition between PFOS concentrations and serum ALT, a marker of hepatocellular damage. [PFOS: coefficient, 0.020; 95% CI: 0.014, 0.026]
Falandysz, J., et al.	2006	Cross Sectional	Bloood draw and survey of Baltic Sea fish consumption	Individuals who declared to have a high fish intake in their diet (mainly Baltic fish) on average contained the highest load of all 10 fluorochemicals when compared with the other human subpopulations. Baltic seafood has been found to highly influence human body burden of PFOS, PFNA, and (PFHxS, PFOSA, PFHxA, PFHpA, PFDA, PFUnDA, and PFDoDA) and to a lesser extent PFOA.

Fei, C., et al.	2008	1,400 women sub cohort from the Dansih national Birth Cohort	Maternal blood sample from early in pregnancy, APGAR score of child, developmental milestone surveys at 6 and 18 months of age	Mothers who had higher levels of PFOA and PFOS gave birth to children who had similar Apgar scores and reached virtually all of the development milestones at the same time as children born to mothers with lower exposure levels. Children who were born to mothers with higher PFOS levels were slightly more likely to start sitting without support at a later age
Fromme, H., et al.	2010	Pregnancy cohort	Pregnancy blood draw, umbilical cord blood, child's blood at 19 months, and breast milk samples	Found low levels of PFCs in cord sera and an increase in concentrations through the first months of infant life. Although the concentrations in breast milk were low, this intake led to a body burden at the age of six months similar to (PFOS) found in adults.
Geiger, S.D., et al.	2014	Cross Sectional (NHANES Survey)	Blood draw and survey (all under <=18 years	Serum PFOA and PFOS were positively associated with high total cholesterol and LDL-C, independent of age, sex, race-ethnicity, BMI, annual household income, physcial activity and serum cotinine levels. Compared to subjects in quartile 1 (referent) the multivariable adjusted OR for high total cholesterol among children in quartile 4 was 1.53 (1.11-1.64) for PFOS. PFOS and PFOA were not significantly associated with abnormal HDL-C and triglyceride levels. Findings indicate that serum PFOA and PFOS are significantly associated with dyslipidemia in adolescents, even at the lower ''background'' exposure levels of the US general population.

Granum, B., et al.	2013	Birth Cohort	Blood draw at time of delivery and from children at 3 years. Survey	Inverse relationship between the level of anti-rubella antibodies in the children's serum at age 3 years and the concentration of four PFCs (PFOA, PFNA, PFOS, and PFHxS).
Inoue, K., et al.	2004	Cohort	Maternal and cord blood samples, birth measurements of the child.	Our results revealed a high correlation between PFOS concentrations in maternal and cord blood (r^2 = 0.876). However, we did not find any significant correlations between PFOS concentration in maternal and cord blood samples and age bracket, birth weight, or levels of thyroid-stimulating hormone or free thyroxine.
Kato, K., et al.	2011	Cohort (NHANES survey)	Blood draw and survey	PFOS concentrations showed a significant downward trend, because of discontinuing industrial production of PFOS. (1999-2008, production phased out beginning 2000)
Watkins, D., et al.	2014	Cross Sectional (C8 Project)	Blood draw and survey	mean serum levels of PFOS were associated with LINE-1 DNA methylation, suggesting that this compound may be epigenetically active.

Title	Additional Info	Link
Perfluoronated compounds in Human Food and Other Sources of Human Exposure	Therefore, it is interesting to note that PFC levels in liver are at least two orders of magnitude higher than exists in muscle tissue. Similar to fish, PFOS is the dominant PFC found in edible aquatic invertebrates such as shrimp, mussels, clams, and oysters	

Title	Additional Info	Link
Bladder Cancer in Perfluorooctanesulfonyl Fluoride Manufacturing Workers	Not significant findings	http://ac.els-cdn.com/S1047279707000580/1-s2.0-S10472797
Cord Serum Concentrations of Perfluorooctane Sulfate (PFOS)and Perfluorooctanoate (PFOA) in Relation to Weight and Size at Birth.	Ponderal index = ratio of birth weight (grams) to length (cm cubed), multiplied by 100. Small Negative associations.	http://www.jstor.org/discover/10.2307/4626991?uid=373983

Isomer Profiles of Perfluorochemicals in Matched Maternal, Cord, and House Dust Samples: Manufacturing Sources and Transplacental Transfer.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3226492/
Perfluorinated Compounds: Emerging POPs with Potential Immunotoxicity	http://www.sciencedirect.com/science/article/pii/S03784274
Community Exposure to Perfluorooctanoate: Relationships between Serum Concentrations and Exposure Sources	http://ehp.niehs.nih.gov/1104436/
Is Fish a Major Source of Fluorinated Surfactants and Repellents in Humans Living on the Baltic Coast?	http://pubs.acs.org/doi/pdf/10.1021/es051799n

Prenatal Exposure to Perfluorooctanoate (PFOA) and Perfluorooctanesulfonate (PFOS) and Maternally Reported Developmental Milestones in Infancy	However, children whose mothers had higher PFOS levels were more likely to start sitting without support at a later age; the adjusted HRs were 0.85 (95% CI, 0.72–0.99) for the third quartile and 0.86 (95% CI, 0.73–1.01) for the fourth quartile (*p* for trend = 0.041) compared with the first quartile.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2569100/
Pre- and postnatal exposure to perfluorinated compounds (PFCs)		http://pubs.acs.org/doi/full/10.1021/es101184f
The Association Between PFOA, PFOS and Serum Lipid Levels in Adolescents.	Dyslipidemia, or abnormal levels of serum total cholesterol, low-density lipoprotein cholesterol (LDL C), high-density lipoprotein cholesterol (HDL-C), and/or triglycerides, has been shown to be a strong, independent risk factor for cardiovascular disease (CVD) in adults. It is likely that the biological effects of PFASs are different at varying serum levels, which may explain some of the discrepancy among existing studies.	http://www.sciencedirect.com/science/article/pii/S00456535

Pre-natal Exposure to Perfluoroalkyl Substances May be Associated with Altered Vaccine Antibody Levels and Immune-related Health Outcomes in Early Childhood.		http://informahealthcare.com/doi/pdf/10.3109/1547691X.20
Perfluorooctane Sulfonate (PFOS) and Related Perfluorinated Compounds in Human Maternal and Cord Blood Samples: Assessment of PFOS Exposure in a Susceptible Population during Pregnancy	Not significant findings	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1247483/
Trends in Exposure to Polyfluoroalkyl Chemicals in the U.S. Population: 1999-2008		http://pubs.acs.org/doi/pdf/10.1021/es1043613
Associations Between Serum Perfluoroalkyl Acids and LINE-1 DNA Methylation	LINE-1 elements make up approximately 17% of the human genome, and the methylation extent of these regions may provide an indication of whether compounds are epigenetically active. Hypomethylation of LINE-1 elements has been associated with genomic instability, risk of cancer, ischemic heart disease, stroke, and hypertension, increased LDL-C, and decreased high density lipoprotein cholesterol (HDL-C), as well as age, sex, race, ethnicity, and environmental exposures.	http://www.sciencedirect.com/science/article/pii/S01604120

State	Info	PFOS				PFOA				PFNA			
		Drinking Water		Soil Screening Level		Drinking Water		Soil Screening Level					
AL	Large amounts of discharge from plant into water sources and then into tributaries of PFOS and PFOA	0.2 µg/L	Based on NOAEL of 8.2E-2 mg/kg/day in [illegible] toxicity for Cynomolgus monkeys	6 mg/kg	Based on the sub-chronic RfD of 8E-5 mg/kg/day	0.4 µg/L	Based on RfD, [illegible] of 0.46 mg/kg/day [illegible]	16 mg/kg	Based on sub-chronic RfD of 2.2E-4 mg/kg/day				
CA	Added to state's list of chemicals of concern, but no risk assessment completed												
		Chronic Non-Cancer Health Risk Limit				Chronic Non-Cancer Health Risk Limit							
MN	Mostly 3M sites and waste disposal facilities	0.3 µg/L		Based on an RfD of 8.0E-5 mg/kg/day in Cynomolgus monkeys (Study done by [illegible])		0.5 µg/L		Based on an RfD of 7.7E-5 mg/kg/day in Cynomolgus monkeys (Study done by [illegible])					
						Drinking Water (Interim) Screening Level				Ground Water Criteria (Interim)			
NJ	Production plant discharge					0.04 µg/L (40 ppt)		For the major endpoint, the screening level resulting in a 10-6 risk level was estimated by linear extrapolation from the serum levels in animals at a dose resulting in an approximate 10% tumor incidence.		1) 0.02 µg/L (20 ppt) Draft 2) 0.01 µg/L (10 ppt) Revised, proposed Draft		1) Based on RfD, serum concentration of 5,200 ng/ml resulting in increased maternal liver weight. 2) New Study primarily used half of the above RfD.	
		Developing a criterion or MCL is under consideration after assigning the PFNA number				Developing a criterion or MCL is under consideration after assigning the PFNA number				Drinking Water Proposed MCL 0.01 µg/L (10 ppt)			
VT	Drinking water health advisory level					0.02 µg/L (20 ppt)							

Fish consumption (MN)					
PFOS	--	--	--	--	--
PFOA	--	--	≤40 ng/g = 1 meal/week	--	--
	--	--	≤200 ng = 1 meal/month		